

Practice Installation and Maintenance

Introduction Changes made to the land during construction have far reaching effects both on and off the site. Contractors can make important contributions to protect water quality by installing the appropriate practices. Because of the many potential effects on the local ecosystem, the services of qualified engineering, design and environmental professionals are necessary in the land grading and construction activities associated with developing a site.

Although this manual describes practices that can help protect surface water and shallow groundwater from pollutants, remember that pollutants can also move through the soil on the construction site and enter groundwater supplies. This can be prevented by removing any pollutants that may be on site before construction begins and by preventing pollutants from entering the site.

Use of This Section The practices in this section are organized by the type of control or function that they provide. Each section has an index tab, so that finding the practice is easier. To help the contractor, site manager, job foreman or inspector, each section is broken into the following six basic parts.

1. A **Practice Description** that defines the practice, describes where and for what it is used, and may include other basic information.
2. The **Recommended Minimum Requirements** section gives some suggested specifications or requirements for the practices that should be respected as minimums. It also suggests either a qualified or registered design professional (see *Glossary*) as the designer of the practice. Note: Site specific designs for the watershed, topography and soils may dictate more restrictive requirements.
3. The **Construction/Installation** section gives step-by-step procedures for installing the practices, with a construction verification checklist at the end. For some practices, several options are given

(i.e., *Soil Bioengineering for Slope Protection* covers nine different practices). Each option will be listed in italics in the left-hand margin.

4. The **Troubleshooting** section indicates when the services of the design professional who put together the design plan are needed.
5. The **Maintenance** section is designed to help the site manager or a designated employee ensure that needed inspections and maintenance activities are completed. This section may also aid the city or county inspector whose job it is to inspect the practices.
6. The **Common Problems** section lists problems that are often found on sites and recommendations for solutions.

Many of the common problems can be avoided by using the recommended minimum requirements and following the construction sequence.

Prior to Construction

Before construction begins, the site manager or job foreman should meet with the design professionals and be supplied with a complete Erosion, Sediment and Stormwater Control Plan including a detailed site map, construction/grading schedule, seeding schedule and maintenance/inspection schedule.

Review all federal, state and local regulations.

Locate all utilities on each site.

The following Decision-Making Chart can help to determine which practices to use in particular situations.

Post-Construction

Maintenance needs and any safety hazards created by the practice should be communicated to the affected landowners, homeowners' association or other parties responsible for ongoing maintenance. Present and future landowners should be made aware of the potential consequences of changing vegetation types, poor maintenance practices or other actions that could cause a practice to function poorly or fail.

Decision-Making Matrix for Erosion, Sediment and Stormwater Runoff Control in Developing Areas

Problem	Solution	Types of Protection	Control Practice	Page
Soil Erosion Sediment (off-site) Dust Dying Grass Unstable Slopes	Soil Protection & Stabilization	Vegetative	Temporary Seeding Permanent Seeding Sodding Tree Protection	35 43 55 67
		Non-vegetative & Combined Vegetative and Non-vegetative	Construction Entrance Mulching Erosion Control Blankets Retaining Wall Land Grading Dust Control Topsoiling Bioengineering	27 61 71 63 77 69 31 93
Sediment flowing into Drains Sediment (off-site)	Sediment Control	Storm Drain Inlet Protection	Fabric Drop Excavated Drop Block and Gravel	163 167 171
		Sediment Barriers	Slit Fence Straw Bales Rock Dams Filter Strips	175 163 169 195
Sediment (on or off site) Erosion on Slopes Erosion in Channels Localized Flooding Wet, Soft Ground Erosion at Outlets	Stormwater Runoff Control	Surface Runoff Control	Temporary Diversion Permanent Diversion Perimeter Protection Right-of-Way Diversion	107 113 119 127
		Runoff Conveyance	Temporary Swale Grass-lined Channel Riprap-lined Channel Temporary Slope Drains Subsurface Drains	123 131 135 139 145
Sediment (on or off site) Flooding (on or off site) Erosion (on or off site) Stream Erosion Pollutants in Runoff	Stormwater Management	Outlet Protection	Rock Outlets Energy Dissipators	151 157
		Sediment & Stormwater Traps	Temporary Sediment Trap Sediment Basin Detention Pond Extended Detention Pond	201 209 217 225
Sediment in Streams Streambed Erosion Streambank Erosion Pollutants in Streams	Stream Protection	Infiltration	Infiltration Basin Infiltration Trench Porous Pavement Constructed Wetland	233 241 247 255
			Temporary Stream Crossing Streambank Protection Streambank Setback	265 273 285

Temporary Gravel Construction Entrance/Exit Pad

Practice Description

A stone base designed to provide a buffer area where construction vehicles can drop their mud to avoid transporting it onto public roads. This practice applies anywhere traffic will be leaving a construction site and moving directly onto a public road or other paved area.

A temporary gravel construction entrance can reduce sediment and resulting safety hazards on public streets.



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Recommended Minimum Requirements

Prior to start of construction, temporary gravel construction entrance/exit pads should be designed by a qualified professional and plans and specifications should be available to field personnel.

- **Aggregate Size:** 2- to 3-inch washed stone
- **Pad Design:**
 - Thickness: 6 inches minimum
 - Width: 12 feet minimum or full width of roadway, whichever is greater
 - Length: 50 feet minimum
- **Washing Facility (Optional):** Level area with minimum of 3 inches of washed stone

- **Geotextile Fabric:** An underliner of woven geotextile (fabric) may be used under wet conditions to provide stability

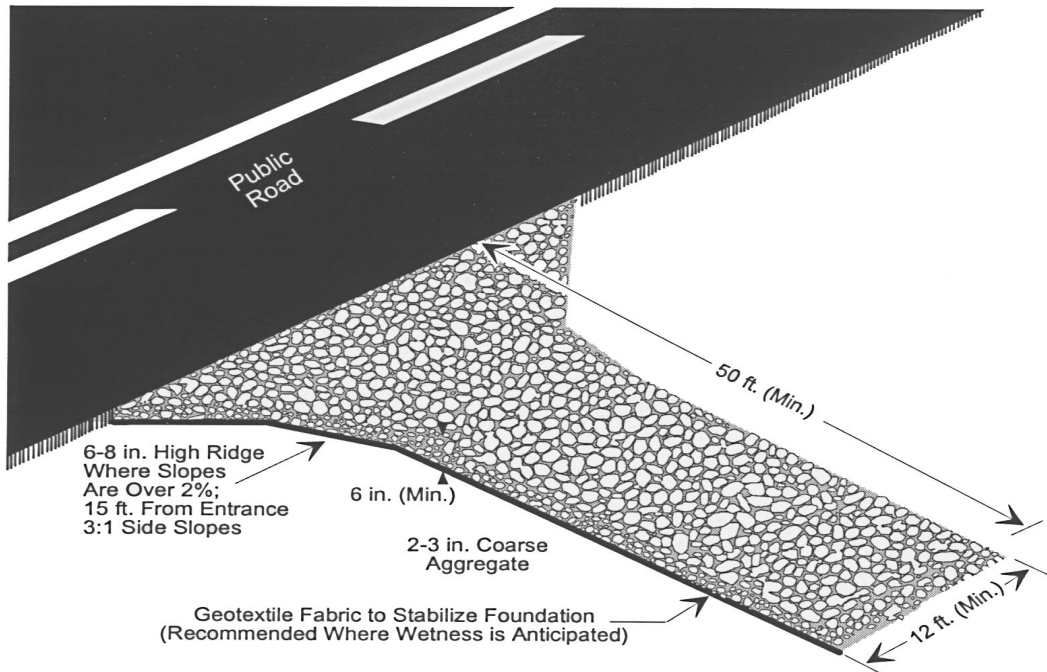


Figure 5.1 Typical Temporary Gravel Construction Entrance

Construction	Avoid locating on steep slopes or at curves on public roads. If possible, locate where permanent roads will eventually be constructed.
Site Preparation	Remove all vegetation and other unsuitable material from the foundation area, grade and crown for positive drainage.
Grading	If slope towards the road exceeds 2%, construct a 6- to 8-inch high ridge with 3:1 side slopes across the foundation approximately 15 feet from the entrance to divert runoff away from the public road.

Install pipe under the pad if needed to maintain drainage ditches along public roads.

Place stone to dimensions and grade shown on plans. Leave surface smooth and sloped for drainage.

Divert all surface runoff and drainage from the stone pad to a sediment trap or basin.

Stabilization If wet conditions are anticipated, place geotextile filter fabric on the graded foundation to improve stability.

Maintenance Inspect stone pad and sediment disposal area weekly and after storm events or heavy use.

Reshape pad as needed for drainage and runoff control.

Topdress with clean 2-inch stone as needed.

Immediately remove mud or sediment tracked or washed onto public road.

Repair any broken road pavement immediately.

Remove all temporary road materials from areas where permanent vegetation will be established.

Common Problems Inadequate runoff control; sediment washes onto public road—install diversions or other runoff control measures.

Stone too small, pad too thin or geotextile fabric absent; results in ruts and muddy conditions as stone is pressed into soil—increase stone size or pad thickness, or add geotextile fabric.

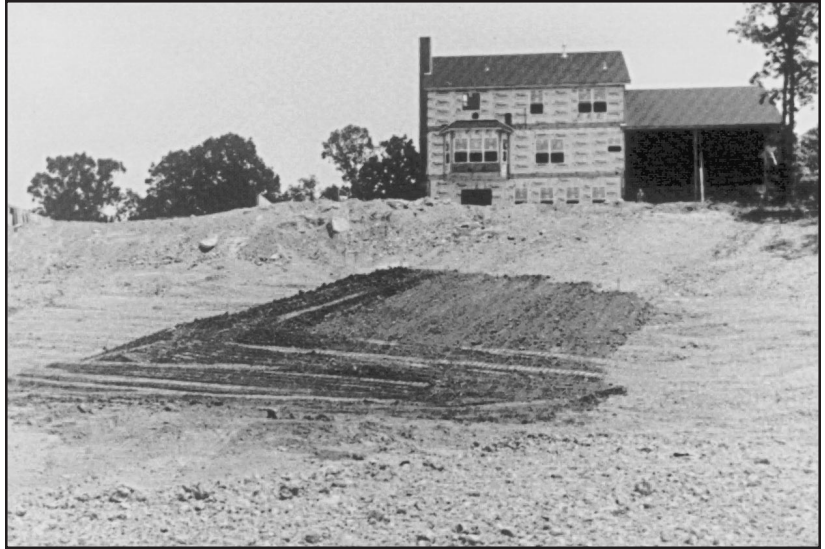
Pad too short for heavy construction traffic—extend pad beyond the minimum 50-foot length as necessary.

Topsoiling

Practice Description

Preserving topsoil prior to construction and using it after construction to help establish vegetation on a construction site. This practice applies to areas on a site that are to be disturbed by excavation, compaction or filling, and to areas where the subsoil is unsuitable for plant growth.

To prevent sloughing on sloping soils, it's important to mix or incorporate topsoil with the underlying subsoil.



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Recommended Minimum Requirements

Prior to start of construction, topsoiling should be designed by a qualified professional. Plans and specifications should be referred to throughout the construction process.

- **Topsoil:** Surface soil or the top layer of undisturbed soil, usually richest in organic matter and nutrients. Should be free of debris, trash, stumps, large rocks, roots and noxious weeds. It should contain no substance that is potentially toxic to plant growth.
- **Minimum Soil Depth:** 24 inches of total soil depth over bedrock (combined topsoil and subsoil); from 8 to 12 inches of total soil depth over loose sand or rock

- **pH Range:** From 6.0 to 7.5. If the pH is less than 5.2, lime should be incorporated in accordance with soil test results.

Construction

Site Preparation	Establish erosion and sediment control practices such as perimeter dikes, diversions, grade stabilization structures, berms, dikes, sediment basins, etc., before stripping.
Stripping	Strip topsoil from areas that will be disturbed by excavation, filling or compaction by equipment. Determine depth of stripping by taking soil cores at several locations within each area to be stripped.
Stockpiling	<p>Stockpile topsoil so that natural drainage is not obstructed. Avoid stockpiling on steep slopes. Side slopes of stockpile should not exceed 2:1. Use sediment fences or other barrier where necessary to retain sediment.</p> <p>Protect stockpile by temporary seeding as soon as possible, but not more than 30 working days after formation of stockpile. If stockpiles will not be used within 12 months, they should be stabilized by permanent vegetation to control erosion and weed growth.</p>
Grading	Established grades should be maintained according to the approved plan and should not be altered by adding topsoil.
Liming of Subsoil	Where the pH of the existing subsoil is below 5.2, incorporate agricultural limestone in amounts indicated by soil tests or specified for the seeding mixture to be used (See <i>Temporary</i> or <i>Permanent Seeding</i>). Incorporate lime into the subsoil to a depth of at least 2 inches by disking. Retest the soil to determine the pH and if pH is not 5.2 or higher, repeat the process.
Roughening	Immediately prior to spreading topsoil, loosen the subgrade by disking or scarifying to a depth of at least 2 inches to ensure bonding of the topsoil and subsoil.

Spreading Topsoil	Spreading frozen or muddy topsoil can prevent proper grading or seeding. Uniformly spread topsoil to a minimum compacted depth of 4 inches. For long-term growth of vegetation without irrigation, minimum soil depth (subsoil and topsoil) should be 8 to 12 inches over loose sand or rock fragments, and 24 inches of soil depth is needed over bedrock.
Construction Verification	Verify that topsoil was spread evenly and incorporated with underlying subsoil.
Troubleshooting	<p>Consult with registered design professional if any of the following occur:</p> <ul style="list-style-type: none">● Depth of topsoil is significantly different than anticipated.● Topsoil appears to contain contaminants.● No topsoil is present on site.
Maintenance	<p>Inspect topsoiled areas frequently until vegetation is established.</p> <p>Repair eroded or damaged areas and revegetate.</p> <p>Topsoil pH too low; results in poor or no vegetation establishment—add agricultural limestone to adjust pH.</p>
Common Problems	<p>Topsoil contains sterilants or toxic chemicals; results in poor or no vegetation establishment—remove contaminated topsoil.</p> <p>Topsoil compacted too much during application; results in poor vegetation establishment—loosen by disking or scarifying.</p> <p>Topsoil not properly bonded to subsoil; results in poor drainage and possible sloughing on steep slopes—remove topsoil, roughen subgrade and respread topsoil.</p> <p>Topsoil removed and not replaced; inadequate vegetation establishment—fertilize according to soil test results, reseed or sod site, and irrigate.</p>

